

Listing of Claims

1 Claim 1 (Withdrawn): A method for controlling one or more properties of a sheet of
2 material to be manufactured on a sheet-making machine that includes a plurality of actuators
3 to control the sheet properties arrayed in a cross-direction of the machine comprising the
4 steps of: measuring properties data about the one or more properties of the sheet of material;
5 and manipulating both the magnitude of each actuator control action and the cross-direction
6 shape of each actuator control action to minimize the variation of the measured properties
7 data from a desired target for each of the one or more properties.

1 Claim 2 (Withdrawn): The method as claimed in claim 1 in which the step of
2 measuring properties data is done by a plurality of scanners.

1 Claim 3 (Withdrawn): The method as claimed in claim 1 including the step of
2 communicating the measured properties data to a controller.

1 Claim 4 (Withdrawn): The method as claimed in claim 3 including the step of
2 calculating the control actions at the controller to communicate to each of the actuators.

1 Claim 5 (Withdrawn): The method as claimed in claim 4 in which the step of
2 measuring properties data is performed at regular intervals to provide feedback to the
3 controller with respect to previous control actions.

1 Claim 6 (Withdrawn): The method as claimed in claim 5 in which the step of
2 calculating control actions involves calculating a first control action that permits variation
3 of the magnitude of the actuator response and a second control action that permits variation
4 in the cross-directional shape of the actuator response.

1 Claim 7 (Withdrawn): The method as claimed in claim 6 in which the first and second
2 control actions are communicated to each actuator as first and second setpoints for each
3 actuator.

1 Claim 8 (Withdrawn): The method as claimed in claim 6 in which the step of
2 calculating control actions is performed taking into account actuator characteristics.

1 Claim 9 (Withdrawn): The method as claimed in claim 6 in which the step of
2 calculating control actions is performed taking into account sheet characteristics.

1 Claim 10 (Withdrawn): The method as claimed in claim 1 in which each actuator
2 comprises a steam actuator having an outlet chamber for releasing steam to the sheet of
3 material, and the step of manipulating the cross direction shape of the actuator control action
4 comprises manipulating the cross-direction position and dimensions of the outlet chamber.

1 Claim 11 (Withdrawn): The method as claimed in claim 10 in which the outlet
2 chamber includes at least one movable baffle plate within the outlet chamber, and
3 manipulating the cross-direction position and dimensions of the outlet chamber comprises
4 moving the at least one movable baffle plate.

1 Claim 12 (Withdrawn): The method as claimed in claim 1 in which each actuator
2 comprises a steam actuator having an outlet chamber for releasing steam to the sheet of
3 material including a screen plate with openings therethrough covering the outlet chamber and
4 at least one movable plate, and the step of manipulating the cross-direction shape of the
5 actuator control action comprises moving the at least one movable plate with respect to the
6 screen plate to fully or partially obstruct the openings in the screen plate.

1 Claim 13 (Withdrawn): The method as claimed in claim 1 in which each actuator
2 comprises a steam actuator having an outlet chamber for releasing steam to the sheet of
3 material including at least one air jet associated with the outlet chamber, and the step of
4 manipulating the cross-direction shape of the actuator control action comprises discharging
5 the air jets to control the steam dispersal.

1 Claim 14 (Withdrawn): The method of claim 1 in which each actuator comprises a
2 nozzle for delivering water atomized by air pressure to the sheet of material, and the step of

manipulating the cross-direction shape of the actuator control action comprises adjusting the air pressure at the nozzle.

Claim 15 (Withdrawn): The method of claim 1 in which each actuator comprises a nozzle for delivering water atomized by air pressure to the sheet of material, and the step of manipulating the cross-direction shape of the actuator control action comprises adjusting the air flow at the nozzle.

Claim 16 (Withdrawn): The method of claim 1 in which each actuator comprises a nozzle for delivering water atomized by air pressure to the sheet of material, and the step of manipulating the cross-direction shape of the actuator control action comprises adjusting the position of a water discharge opening of the nozzle with respect to an air discharge opening of the nozzle.

Claims 17 - 20 (Canceled)

Claim 21 (Previously Presented): A system for controlling one or more properties of a sheet of material to be manufactured on a sheet-making machine comprising:

a plurality of actuators distributed in the cross-machine direction over said sheet of material, each actuator being operable to perform a first control action with a magnitude on a slice of said sheet of material, the actuator also being operable to perform a second control action to manipulate a cross-directional shape within said slice, each of said plurality of actuators being controllable to vary the properties of said sheet of material by varying both said magnitude and said cross-directional shape within said slice;

scanners distributed over said sheet of material to measure properties data about the properties of said sheet of material; and

a controller in communication with said scanners for calculating said first control action and said second control action for each of said plurality of actuators, and implementing said first control action and said second control action at each of said plurality of actuators such that said actuators co-operate to adjust the properties of said sheet of material to desired targets.

1 Claim 22 (Previously Presented): The system of claim 21 in which each of said
2 plurality of actuators comprises a steam actuator having an outlet chamber for releasing steam
3 to said sheet of material with the cross-direction position and dimensions of each outlet
4 chamber being manipulatable to control said cross-directional shape within said slice.

1 Claim 23 (Previously Presented): The system of claim 22 in which said outlet chamber
2 of said steam actuator includes at least one movable baffle plate which is movable to control
3 said cross-direction position and dimensions of said outlet chamber.

1 Claim 24 (Previously Presented): The system of claim 21 in which each of said
2 plurality of actuators comprises a steam actuator having an outlet chamber for releasing steam
3 to said sheet of material and including a screen plate with openings there through covering
4 the outlet chamber and at least one movable plate, such that moving the at least one movable
5 plate with respect to the screen plate acts to fully or partially obstruct openings in the screen
6 plate.

1 Claim 25 (Previously Presented): The system of claim 21 in which each of said
2 plurality of actuators comprises a steam actuator having an outlet chamber for releasing a
3 flow of steam to said sheet of material including at least one air jet associated with said
4 outlet chamber dischargable to control the shape of the steam flow.

1 Claim 26 (Withdrawn): The system of claim 21 in which each actuator comprises a
2 nozzle for delivering a water spray atomized by air pressure to the sheet of material including
3 means for adjusting the air pressure at the nozzle to control the shape of the water spray.

1 Claim 27 (Withdrawn): The system of claim 21 in which each actuator comprises a
2 nozzle for delivering a water spray atomized by air pressure to the sheet of material including
3 means for adjusting the air flow at the nozzle to control the shape of the water spray.

1 Claim 28 (Withdrawn): The system of claim 21 in which each actuator comprises a
2 nozzle for delivering a water spray atomized by air pressure to the sheet of material, the
3 nozzle having an water discharge opening and an air discharge opening that are adjustable
4 by position with respect to each other to control the shape of the water spray.

1 Claim 29 (Withdrawn): The system of claim 21 in which each actuator comprises an
2 induction heating coil for heating at least one of a pair of rolls to change the diameter of the
3 at least one roll in order to vary the gap between the pair of rolls and thereby the thickness
4 of a sheet of material passing between the rolls with each coil having multiple windings for
5 generating magnetic fields whereby controlling the currents to each of the multiple windings
6 controls the cross-direction shape of the actuator response.

1 Claim 30 (Withdrawn): The system of claim 21 in which each actuator comprises an
2 induction heating coil for heating at least one of a pair of rolls to change the diameter of the
3 at least one roll in order to vary the gap between the pair of rolls and thereby the thickness
4 of a sheet of material passing between the rolls, each heating coil being mounted for
5 pivotable movement whereby adjusting the angle of the heating coil controls the
6 cross-direction shape of the actuator response.

1 Claim 31 (Withdrawn): The system of claim 21 in which each actuator comprises an
2 array of infrared heating lamps for heating the sheet of material whereby controlling the
3 voltage of each heating lamp controls the cross-direction shape of the actuator response.

1 Claim 32 (Withdrawn): The system of claim 21 in which each actuator comprises a
2 gas-fired infrared emitter matrix for generating infrared radiation to heat the sheet of material,
3 the emitter matrix being heated by combusting gas and having screen plates with openings
4 there through adjacent the emitter matrix, whereby moving the screen plates with respect to
5 each other to fully or partially align or misalign openings in the screen plates acts to vary the
6 gas supply to the emitter matrix to control the cross-direction shape of the actuator response.

1 Claim 33 (Withdrawn): The method as claimed in claim 1 in which each actuator
2 comprises a motor for controlling the position of a slice lip mounted to a head box, and the
3 step of manipulating the cross direction shape of the actuator control action comprises
4 manipulating the global position of the slice lip.

1 Claim 34 (Previously Presented): The system of claim 21, wherein each of said
2 plurality of actuators is operable individually to perform said first control action and said
3 second control action.

1 Claim 35 (Previously Presented): The system of claim 21, wherein each of said
2 plurality of actuators is controllable to vary the properties of said sheet of material by
3 simultaneously varying both said magnitude and said cross-directional shape within said
4 slice, and wherein said controller implements said first control action and said second control
5 action simultaneously at each of said plurality of actuators such that said actuators co-operate
6 to adjust the properties of said sheet of material to desired targets.